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ABSTRACT

Carbohydrate loading is a frequently used technique to improve performance by altering an athlete's diet. The objective is to increase glycogen stored in muscles for use in prolonged strenuous exercise. For two to three days, the athlete consumes a diet that is low in carbohydrates and high in fat and protein while continuing to exercise and deplete muscles of their glycogen. The diet is then drastically changed to a low-fat, moderate-protein, high-carbohydrate diet for two to three days prior to the event. During this time, training should be light. On the day of competition, the athlete may eat whatever he or she feels will enhance performance, avoiding high-fat foods and sweets. This is an effective practice for endurance exercises which last an hour or more. Carbohydrate loading should be undertaken with the supervision of a physician. (DC)

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May 25, 1983

CARBOHYDRATE LOADING

QUESTION: Could you please explain to me what a carbohydrate loading diet is?

JUDY
PRINCETON

ANSWER: The relationship between diet and athletic performance is recognized. However, there are controversies over the amount of carbohydrate, fat and protein an athlete should consume. Every athletes' caloric need will depend on their age, sex, height, weight and activity level. A diet containing 10% to 15% protein, 30% fat and 55% to 60% carbohydrate is recommended for athletes. This proportion of carbohydrate, fat and protein is not only recommended for athletes, but for the general American population as well.

Because of the high energy expenditure during training and athletic competition, athletes do require more calories than the average person. These extra calories can easily be consumed by adding a few extra servings of fruits and vegetables as well as breads and cereals. Sugars and fats, in moderation, can also be added to enhance the flavor of foods and add a few extra calories.

One technique which is frequently used by athletes is called carbohydrate loading. The objective of carbohydrate loading is to increase glycogen stored in muscle for use in prolonged strenuous exercise. Up to 450 grams of carbohydrate can be stored as glycogen in muscles and liver. This practice of carbohydrate loading involves first reducing the carbohydrate content of the diet for 2-3 days while continuing to exercise and deplete muscles of their glycogen. The diet during the first 2-3 days is low in carbohydrates (50-75 grams), high in fat and protein. At least 50 grams of carbohydrate is needed to prevent an abnormal state known as ketosis. Ketosis is due to an undesirably high concentration of ketones in the urine and blood when carbohydrates are not available for energy. The body then breaks down fats which result in the build up of ketone bodies.

Following the 2-3 days of low carbohydrate intake, the diet is then drastically changed to a low-fat, moderate protein, and high carbohydrate (270-450 gram) diet 2-3 days prior to the athletic event. During this time, the training should be light to facilitate the muscles in storing glycogen. On the day of competition, the individual may eat whatever he or she

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foods will help increase performance. Foods of high-fat content as well as concentrated sweets should be avoided on the day of competition. If a large meal is eaten, one should allow 4 to 5 hours for digestion before participating in an athletic event.

After the muscles have been depleted of glycogen, it is felt that the muscle glycogen storing capacity is twice that of normal. Carbohydrate loading is an effective practice for endurance exercises which are very exhaustive, lasting an hour or more. Carbohydrates are a major source of energy during endurance exercises. The higher the glycogen stores in the muscles, the greater the potential to perform strenuous, long-duration exercises. Protein is an essential part of every diet. However, it is not the best food source to supply muscles with energy during athletic competition. The average part time athlete will have enough glycogen to meet his or her energy needs from a normal diet consisting of the previously stated proportions of carbohydrates, fats and protein.

In summary, athletes have the same nutritional needs as everyone else, with the exception of additional calories to cover their high energy expenditure. The practice of carbohydrate loading is widespread. However, it should be undertaken with caution. As with any diet regime and exercise program, one should have a medical check up and be under the supervision of their physician.

A good resource book for specific recipes and suggested menus is THE ATHLETE'S KITCHEN by Nancy Clark, M.S., R.D.